

Upper Freeport Coal Bed along Laurel Ridge in Preston county of West Virginia." By John J. Stevenson, Professor of Geology in the University of the City of New York.

Mr. Fraley reported by letter that he had received and paid over to the Treasurer the last interest on the Michaux Legacy due Jan. 1, 1881, amounting to \$129.60.

And the meeting was adjourned.

*The Upper Freeport Coal Bed along Laurel Ridge in Preston County of West Virginia. By John J. Stevenson, Professor of Geology in the University of the City of New York.*

(Read before the American Philosophical Society, February 4, 1881.)

Laurel ridge, the easterly boundary of Ligonier valley in Pennsylvania, enters West Virginia at or very near the north-western corner of Preston county. It is a bold anticlinal, which in Indiana, Westmoreland and Fayette counties of Pennsylvania, as well as in Preston and Barbour counties of West Virginia, exposes the bottom of the Lower Carboniferous, and at some localities brings up the Chemung rocks, while the Conglomerate and the Lower Productive Coal group, the Allegheny series of Lesley, are shown on its sides. The fold is cut transversely by several deep gaps in Pennsylvania, where it shows no longitudinal valleys of considerable extent; but in Preston county of West Virginia it is divided longitudinally by Cheat river, whose gorge is one of the most noteworthy attractions of the Baltimore and Ohio railroad.

A strip, extending nearly twelve miles along the westerly slope of the ridge in Preston county, and divided by the Baltimore and Ohio railroad, was visited by the writer in December of 1880. The *Upper Freeport Coal Bed*, the most important member of the Lower Productive Coal group, presents some features there which may be deserving of note.

The easterly outcrop of that bed is crossed by the railroad at probably two miles eastward from Tunnelton station, and there, on the Graham-Beall estate, an old opening was examined which showed the following section:

- |                            |              |
|----------------------------|--------------|
| 1. Mahoning sandstone..... | not measured |
| 2. Shale.....              | 0' 3"        |
| 3. Coal.....               | 3' 10"       |
| 4. Clay.....               | 0' 2"        |
| 5. Coal.....               | 1' 8"        |

But the exposure at the bottom is not complete, for, underlying the measured portion, is some good coal, and still lower is a considerable thickness of impure slaty coal, which is not worth digging. The coal, as far

as exposed, is very good, more or less prismatic, very soft and easily mined. For the most part, it is clean, but thin streaks of pyrites occur in the top 10'', and minute scales of the same mineral appear occasionally in the bottom 8''. Above the coal and separated from it by but 2 or 3 inches of shale is the hard gray Mahoning sandstone, which lies in thick beds and forms an excellent roof. The exposure of this rock does not give the thickness.

The sandstone is well shown along the railroad between this place and Tunnelton. Owing to the crookedness of the road, the bottom of the rock is sometimes below, sometimes above the track, but rarely many feet in either the one way or the other. Frequently, however, the coal is at track level, and at Tunnelton it is far enough above that to be worked. It descends toward the tunnel beyond the station, but in the tunnel rises again so as to form the roof at the westerly end. Thence, however, the course of the road follows the dip of the rocks, and the coal soon comes down to the track-level, where it is mined and shows the following section :

<i>Coal</i> .....	2' 8''
<i>Clay</i> .....	0' 2''
<i>Coal</i> .....	2' 8''

The exposure is incomplete at the top, but reaches very nearly to the bottom of the good coal. The slaty division below is said to be not far from 3 feet, in which case the full thickness of the bed is about 9 feet 6 inches. The quality of the measured coal here is similar to that of the coal seen at the Graham-Beall pit. Eight inches of the slaty coal were seen. It contains some good splint, but for the most part appears to be worthless. The roof at this pit is shale, which varies in thickness from 2 inches to 12 feet ; but it is hard, and makes a very good roof. The Mahoning sandstone is shown in the hill above this pit.

Within one fourth of a mile from this opening, the railroad crosses a deep gorge, in which the coal bed is exposed below the track with several feet of shale between it and the Mahoning sandstone, which forms a bluff on each side of the gorge. The thickness of the shale varies abruptly, and the limits seem to be as given above. From this ravine, the coal rises until at Austin station it is above the track, and at half a mile further it is mined and coked by the Austin Mining Company.

The outcrop of the bed is easily followed southward from the railroad, and lies at but a little way eastward from the ridge-road leading from Tunnelton to the Northwestern turnpike. The coal is reached at that pike. Few of the ravines thus far are deep enough to expose the coal, but that through which Sandy creek runs affords good exposures, and the bed had been opened at several places along that stream.

Beyond the point where the ridge road reaches the pike, at say five miles from Tunnelton, the ravines become deeper and exposures of the bed are numerous. Pits were seen on several farms. In this direction, the bed becomes thicker though it seems hardly to improve in quality. One opening, seen on Mr. Wolf's farm at about eight miles from Tunnelton, shows 11

feet of coal without any persistent parting, though there are many insignificant partings which continue for but a few yards. The coal appears to be more sulphurous here than it is nearer the railroad, and the ash is greater.

The bed was followed northward from the railroad for several miles, but its structure there is similar to that seen in the pits on the railroad.

The dip throughout is north-westward, and the undulations with respect to the track are due to curves in the railroad.

The especial feature of the bed here, aside from its thickness, is its freedom from sulphur. In the Ligonier valley of Pennsylvania, according to Mr. McCreath's analyses, the sulphur in *Upper Freeport coal* varies from 1.414 to 4.789, and the coal rarely yields a firm coke. The ash varies from 3 to 6 per cent. Further south, in Upshur and Randolph counties of West Virginia,\* the sulphur is high, and the ash is considerable even when the coal is best.

Within the area immediately under consideration, the coal from this bed yields an excellent coke. The Austin Company has found a ready market for its product, which in Chicago competes on even terms with the Connellsville coke. Several car loads of coal from the vicinity of Tunnelton were sent to Connellsville and there coked. Two lots were sent to the Cambria Iron Works, where analyses were made by Mr. Morrell with the following results:

Car No. 1, made from *sound coal*:

Carbon .....	92.64
Sulphur .....	0.53
Ash.....	6.82

Car No. 2, made from *outerop coal*:

Carbon .....	88.05
Sulphur.....	1.41
Ash.....	10.54

Coke made from coal obtained at another opening was sent to the Edgar Thompson Steel Works, where it was analysed by Mr. S. A. Ford, with the following results:

Fixed carbon.....	88.163
Volatile matter.....	0.875
Sulphur.....	0.837
Ash .....	10.125

These tests seem to have been sufficiently extensive to determine the value of the coal for coking purposes. The loss in coking, as reported by Mr. M. L. Schaefer, Superintendent of the Austin Company, is about 33 per cent, indicating a composition very nearly like that of the *Pittsburgh coal bed* in the Connellsville basin.

\*For description of the bed in these counties, see *Notes on the Geology of West Virginia*, by the writer, read before this Society on February 5, 1875.

It is evident then that the *Upper Freeport coal bed* in this region will yield a coke which is not appreciably inferior to that made at Connellsville, Pennsylvania.

Few details were gathered respecting the general section exposed along the slope of Laurel ridge, as all detailed work was stopped by a severe snow storm. A bed of cannel was seen at not far from 165 feet above the *Upper Freeport*. On one side of Sandy creek, this bed shows 4' 8" of cannel, but on the other side of that creek it shows no cannel, and contains only bituminous coal, 3' 6" to 4' thick. The cannel was worked many years ago for distillation of oil, but the works were abandoned on the discovery of petroleum.

The Freeport limestone is present at from 40 to 50 feet below the *Upper Freeport coal bed*, and is exposed at one locality nearly three miles north from the railroad. It is 3 feet thick, and rests on a bed of iron ore, which is 30 inches thick and very persistent. This ore was mined at one time both by benching and drifting, and the material was sent to the Irontown furnace, where it produced a foundry iron. It is too cold-short for use alone, and to be available must be mixed with some ore containing little or no phosphorus. A small coal bed rests on the limestone, and another, about 2 feet thick, is shown at nearly 70 feet lower.

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*Memoir of S. S. Haldeman, A. M., Ph. D., etc. By D. G. Brinton, M. D.*

(*Read before the American Philosophical Society, February 4, 1881.*)

In presenting a sketch of the life of the late Professor Haldeman, I shall begin with his personal history, and then proceed to give a brief account of his contributions to science.

Samuel Stehman Haldeman was born August 12, 1812, at Locust Grove, a beautifully situated country-seat on the east bank of the Susquehanna river, twenty miles below Harrisburg. The house, with the extensive property surrounding it, had been in the possession of his ancestors for several generations.

The family came originally from Thun, in German Switzerland, and were an energetic, independent race, who had been honored in their day. Jacob Haldeman, a great-grandfather of the subject of this memoir, was chosen one of a Committee of Public Safety from Rapho township, Pa., in revolutionary times. Frederick Haldimand, a great-uncle who had entered the English military service, became first Governor-General of Canada under that rule. John B. Haldeman, a grandfather, was member of the General Assembly from Lancaster county, in 1795. The name was formerly spelled with either *i* or *e* in the second syllable and the final *d* rejected or retained according to the language of the canton in which it was found, but as it was of Germanic origin, Prof. Haldeman always used the German method.